

January 21, 2020

Maine Department of Environmental Protection
106 Hogan Road
Bangor, Maine 04401

Dear Jessica,

I am in possession of the Silver Maple Wind Farm Visual Impact Assessment and assorted attachments that are on the DEP web page for the project. In addition, in response to my request Strum Consulting has provided data used to conduct the VIA.

Silver Maple Wind Project is a 20 MW development that proposes to install 5 Vestas V136 turbines with a height to hub of 117 m and to upraised blade tip of 185 m. It is immediately adjacent to the existing Pisgah Mountain 9 MW wind project that used five Vestas V90-1.8 turbines with a height to hub of 95 m and to upraised blade tip of 145 m. (This is according to the application, though the data provided by Strum indicates that the model is a Vestas V100, which would be 5 m taller.) These 10 turbines will be experienced as a single project, though there are two different sized turbines.

The VIA has sufficient shortcomings that I have decided to provide this preliminary report in memo form. There does not seem to be an awareness that the Wind Energy Act (WEA) and Chapter 382 provide detailed procedures for conducting a VIA. These procedures have not been followed.

1. Scenic Resources of State or National Significance (SRSNS)

The WEA requires that visual impacts be limited to SRSNS, which are generally identified in specified databases. There are many problems with the identification of SRSNS within 8 miles of the project (i.e., the study area)

These are the SRSNS that are in the project area. The letters that precede each category come from the WEA. Those that are not identified by in the VIA are underlined.

A. Nation Natural Landmarks, wilderness, or comparable outstanding natural and cultural feature. There are possible “comparable” areas that are identified as part of the Maine Natural Areas Program’s Focus Areas (<https://www.maine.gov/dacf/mnap/focusarea/index.htm>).

- Bald Bluff Mountain
- Upper Union River (which is also a scenic river)

B. Property listed on the National Register of Historic Preservation.

- Lucerne Inn
- East Eddington Public Hall

- Cliffwood Hall
- Harold Allan Schoolhouse
- Holden Town Hall

D. Great Pond rated as an outstanding or significant scenic resource.

Outstanding Scenic Resources

- Second Pond
- Hopkins Pond
- Mountainy Pond
- Hatcase Pond
- Halfmile Pond

Significant Scenic Resource

- Chemo Pond
- Parks Pond
- Jellison Hill Pond

E. River segment rated as a unique or outstanding scenic resource.

Outstanding Scenic Resource

- West Branch Union River (Graham Lake to headwaters of Great Pond)

2. Locations erroneously identified as SRSNS

- It is required that SRSNS have public access, and public access is prohibited by law to two great ponds with outstanding scenic quality because they are within lands owned by the Bangor Water District to protect Bangor's water supply.
 - Burnt Pond
 - Floods Pond
- There are scenic resources identified in the VIA that should not be considered in the DEP review because they are locally designated.
 - Peaked Mountain
 - Little Peaked Mountain
 - Parks Pond Bluff
 - Eagle Bluff
- There are resources that do not meet the WEA criteria (§3451.9).
 - Graham Lake is a reservoir and it is not rated S or O as a scenic resource.
 - Green Lake it is not rated S or O as a scenic resource.
 - Holdbrook Pond it is not rated S or O as a scenic resource.

In summary, I can identify 16 possible SRSNS, 9 of which were not considered in the VIA. In addition, the VIA identified 9 scenic resources that are not SRSNS and cannot be considered in the DEP review.

3. Determining Visibility at SRSNS.

The VIA determined where the five turbines hubs (117 m high) of the would be visible for more than 8 miles over bare terrain. The analysis appears to have been conducted with WindPro software. Digital height data comes from 2-foot contours, which is converted to a grid with a 25 m resolution, which is substantially coarser than the standard 10 m DEM from The National Map. The results of the visibility analysis are mapped in Drawing 2b.

This does not meet the requirements of the WEA and Chapter 382.

- a. Visibility of a turbine beyond 8 miles is determined to be insignificant (§3452.3). Therefore, DEP cannot consider visibility from greater distances, as presented in the VIA.
- b. The WEA requires that the “number and extent of turbines visible” must be identified (§3452.3.F), and Chapter 382.G.1 requires that all areas “of the SRSNS from which the project is visible” be identified. Both of these requirements indicate that the visibility of the highest point (i.e., an upright blade tip) must be determined, though it is also common to map visibility of the turbine hub.

Visibility maps were prepared over bare terrain and screened with forest vegetation for the upright blade tips (185 m) and the turbine hubs (117 m). The 1/3 arc-second National Elevation Data (NED) was projected to NAD 1983 UTM zone 19N, and resampled to 10 meters. The forest screen came from the 2016 national Land Cover Data forest types and was assigned a fixed height of 12 m, as specified in Chapter 382. These are attached as Maps 1 through 4.

The terrain viewshed for the turbine hubs prepared for the VIA is compared to the similar viewshed prepared for this review. They were similar except in the southeast quadrant where the VIA viewshed generally showed much greater visibility. In addition, there is an anomaly of a corridor without visibility running east and south from the center of Floods Pond, which define the pie-slice edges of this quadrant.

4. Preparation of photosimulations.

The VIA prepared photosimulations for 7 viewpoints representing 9 scenic resources. However, only 4 of these viewpoints are for SRSNS locations. Chapter 382.3.G(1) requires that the VIA “must include photosimulation of views of the project from the SRSNS.” In other words, if there will be visibility of the project from a SRSNS, then there should be a simulation representing that visibility, and one assumes that it should be the view with the greatest impact (aka “worst case” view). Based on the VIA visibility analysis and the updated list of SRSNS, it appears that there should be photosimulations from:

- Bald Bluff Mountain (if Focus Areas qualify as SRSNS)
- Mountainy Pond
- Hatcase Pond
- Chemo Pond
- Parks Pond
- West Branch Union River (which is also the Upper Union River Focus Area)

Photosimulations are not required at locations where there is no possible visibility, as indicated by the viewshed of an upraised blade tip over bare terrain.

- Lucerne Inn

- Halfmile Pond
- Jellison Hill Pond
- Second Pond

The simulations that accompanied the VIA did not include any documentation, just the images. At a minimum every simulation should include a separate cover sheet with:

- Name of the scenic resource
- Name of viewpoint and GPS location points with an accuracy of at least 3 m.
- Map and/or aerial photo showing the location and cone of vision.
- Camera make and model, lens focal length, EFL, and other camera settings used.
- Date, time, and weather conditions at the time the photo is taken.
- Date and other pertinent information describing the timeliness of the design specification.
- The dimensions of the image in pixels
- Directions for printing and viewing the photosimulation.

The simulations that were prepared are based on 12-megapixel photos taken with an iPhone using a 28mm full-frame sensor equivalent focal length (EFL) lens. It is common practice to use a 50mm EFL because when printed on a tabloid sheet and held at a comfortable arm’s length (about 20 inches) it will approximate the absolute scale of the turbines in the view. A 28mm EFL must be held at approximately 12-13 inches away, which is too close to be comfortable and is difficult to view with two eyes. In addition, the resolution when printed is well below “retinal resolution” and the printer’s capabilities, meaning that the turbines will not have the definition that they should.

In previous reviews I have used ArcScene visualizations to assess the scale and positionally accuracy of visual simulations. These visualizations are based on the GIS data used for the visibility analysis. The shaded relief ground plane is based on the 10 m NED data. A green forest canopy is draped over it at 40 ft (12 m) and a lighter green canopy at 60 ft (18 m). These data are coarse, with a 30 m resolution, so they do not accurately reflect foreground conditions.

Visualizations are presented for two viewpoints. The first is the East Eddington Public Hall, for which there is a visual simulation with a 28mm EFL, and a 300 percent magnification (approximately a 85mm EFL). The second is from Chemo Pond, for which no photosimulations were prepared in the VIA. These visualizations have been prepared to show the effect of different EFL on the apparent prominence of the Pisgah and Silver Maple turbines. **Table 1** lists the horizontal angle of view (HAoV) for the EFLs for each of the visualizations, and the appropriate viewing distance when they are printed 10 inches wide on a letter sheet of paper, or 16 inches wide on a tabloid sheet of paper.

Table 1. Horizontal angle of view (HAoV) for selected effective focal lengths (EFL)

EFL	HAoV	Viewing Distance (in)	
		10 in width	16 in width
28mm	65.5°	7.8	12.4
50mm	39.6°	13.9	22.2
75mm	27.0°	20.8	33.3
85mm	23.9°	23.6	37.8

Of particular interest is the comparison of the East Eddington Public Hall photosimulations and visualizations for the 28mm EFL/65.5° HAOV and 85mm EFL/24 HAOV. The scale and position of the turbines seem to generally be in agreement. However, the simulations fail to represent visual impacts from the associated facilities, such as project clearing for roads and around the turbines. For instance, see the Eagle Bluff simulations which includes the existing clearing around the Pisgah Mountain turbines.

Finally, I would also like to raise two issues not generally discussed in the VIAs. First, the visual prominence of the turbines is affected by their backdrop and lighting. The turbines are less apparent against a white cloudy sky than they are against a clear blue sky or forested background. Similarly, turbines will appear white when front lit (i.e., the sun is behind the photographer), but darker when backlit. For example, in the East Eddington Public Hall simulation the turbines are whiter because they are front lit, but their apparentness is dampened because they are viewed against clouds. This simulation should represent a blue-sky condition, otherwise people will not understand the worst visual impacts that they will likely encounter. The Peaked Mountain simulation in Figure 1 shows how the contrast of the turbines with a forested background makes them more apparent than the contrast with the light blue sky. This simulation also illustrates the darkening effect that cloud shadows have on the landscape—if the turbines were in shadow, they would be dark gray rather than white.



Figure 1. The view from Peaked Mountain on April 17, 2019 showing the existing Pisgah Mountain and simulated Silver Maple wind turbines. (Source: Strum Consulting data discovery).

The second concern is whether views from inside buildings at locations where the public can be expected to look at the landscape need to be considered. This situation arises at the Cliffwood Hall. The draft wireframe simulation in Figure 2 indicates that the turbines would be screened from the parking area. However, it is unclear whether they would or would not be visible from the second story. If the second floor is commonly used by the public and presents clear views of the project, should it be the simulated view?



Figure 2. The view from the Cliffwood Hall parking area showing the location of the Silver Maple (red) and Pisgah (blue) wind turbines. (Source: Strum Consulting data discovery).

5. Evaluation criteria

There is apparently a “Basic Assessment” to determine whether the significance of the SRSNS, and if it is “Low” then “no further analysis was conducted for that SRSNS. While Significance is a criterion specified §3452.3(A) of the WEA, there is no basis to use that to remove a SRSNS from complete analysis. The only legitimate reason not to conduct a full analysis of a SRSNS is that there is no possible visibility within the property boundaries. SRSNS that were determined to have a medium or high significance or were within 3 miles of a turbine were given a “Visual Impact Assessment.” However, the analysis methods used in the VIA are not documented.

WEA §3452.3 identifies the evaluation criteria that must be considered and Chapter 382.3 provides further guidance in the appropriate approach to conducting this evaluation.

- A. Significance of the potentially affected SRSNS
- B. Existing character of the surrounding area
- C. Expectations of the typical viewer
- D. Purpose and the context of the proposed activity;
- E.1 Extent, nature and duration of potentially affected public uses
- E.2 Effect on the public's continued use and enjoyment
- F. The scope and scale of the potential effect of views, including number and extent of turbines visible, the distance from the SRSNS and the effect of prominent features of the development on the landscape.

These criteria are not optional, and the VIA does not describe how they are applied to the evaluation of impacts. The normal procedure is past wind project VIAs has been to define how impacts will be measured according to each criterion, and then to address each criterion for each SRSNS. The only analysis appears to relate to the project visibility and is described in Tables A1 through A4; there does not appear to be any difference between the “Basic Visual Assessment” (Tables A1 and A3) and “Visual Assessment” (Tables A2 and A4). Since the WEA evaluation criteria were not used in the Silver Maple Wind Project, there is no basis to determine whether the visual impacts are low, medium or high, and whether collectively they are unreasonable.

6. Cumulative impacts

The Silver Maple Wind Project is visually an extension of the existing Pisgah Mountain Wind Project. The WEA (§3452.3) requires consideration of cumulative effects and how to do this is further described in Chapter 382. The VIA did not consider cumulative impacts.

7. Conclusions

Silver Maple Wind project is a 5-turbine 20 MW. Taken together with the Pisgah Mountain Wind project, this project is comparable to the Spruce Mountain and Saddleback Mountain wind projects, and slightly smaller than several other wind energy developments. All of these projects submitted a comprehensive VIA that was in conformance with the WEA, which also informed the development of Chapter 382 regulations. However, the Silver Mountain Wind project VIA does not meet these requirements. Specifically, the VIA:

1. Does not appropriately identify all SRSNS within 8 miles of the turbines.
2. Does not conduct the required visibility analysis for the upraised blade tips over bare terrain.
3. Does not prepare photosimulations at all SRSNS from publicly accessible viewpoints where there will be visibility.
4. Does not describe and apply the evaluation criteria prescribed by the WEA.
5. Does not evaluate cumulative impacts, particularly with the proximate Pisgah Mountain Wind project.

This presents a conundrum, since there is insufficient information to make a determination of whether the visual impacts are unreasonable or not. It is my recommendation that SWEB Development USA, LLC be asked to address these shortcomings and submit a revised VIA.

Submitted by,

A handwritten signature in black ink that reads "James F. Palmer". The signature is fluid and cursive, with the first name "James" being larger and more prominent than the last name "Palmer".

James F. Palmer, PhD, FASLA

Scenic Quality Consultants

ATTACHMENTS

Viewsheds

1. Terrain Viewshed for Blade Tips
2. Terrain Viewshed for Turbine Hubs
3. Forested Viewshed for Blade Tips
4. Forested Viewshed for Turbine Hubs
- 5a comparison of SQC and VIA Viewsheds
- 5b comparison of VIA and SQC Viewsheds

Visualizations

1. Chemo Pond with a 66° Horizontal Angle of View
2. Chemo Pond with a 40° Horizontal Angle of View
3. Chemo Pond with a 27° Horizontal Angle of View
4. Chemo Pond with a 24° Horizontal Angle of View
1. East Eddington Public Hall with a 66° Horizontal Angle of View
2. East Eddington Public Hall with a 40° Horizontal Angle of View
3. East Eddington Public Hall with a 27° Horizontal Angle of View
4. East Eddington Public Hall with a 24° Horizontal Angle of View